WOOD---*A Strategic War Material*

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World War II has brought many changes and problems. Things never dreamed of two years ago are confronting the nation. Both the Army and the Navy must be equipped, and, at the same time, civilian demands must be met. Ships, tanks, planes and other equipment for America and for her allies must be transported around the globe. In many cases, the sources of supply are cut off. Other materials are scarce. Yet our needs are continually growing.

It is to step in and help fill up the gap that scientists and engineers are searching for new substitutes and new methods. What they have found is both amazing and useful.

Wood, humble, unassuming and practical, one of the oldest building materials in the world, is coming into the limelight. Years ago our forefathers used it for almost everything, but recently it has been lost in the switch to metals. Now however, through new treatment, wood is taking the place of metal. Like the prodigal son, wood has come back and is making impressive steps forward.

Wood is not being used in the same manner as it was before. In fact its present usefulness is being made possible by about four new developments. These are the new water resistant glues and treatment, different types of connectors and synthetic plastics which consist of the thermosetting group and the thermoplastic group.

The connector system, brought over from Europe, has made it possible to build large wooden spans which have the strength of the individual timbers. There are many types of these connectors, the split ring and the toothed ring being the most common.

The split ring is the one most often used. A round piece of metal, split in one side, is placed in precut grooves in the wood. This type of connector is used for making wood to wood connections. Its only disadvantage is that it is not very siutable when only manual labor is available.

The toothed ring is a round piece of metal with alligator teeth on each side of the ring. The toothed rings do not require precut grooves. They are forced into the wood by pressure. Their advantage over the split rings is that they can be installed easily when only manual labor is available.

There are many other types of connectors such as the spike grid, clamping plate and claw plate. Each has its special use.

The spike grids, of which the single curved is the most important, are interlaced strips of metal with spikes sticking through them. They are used for dock and trestle construction. By using a single curve grid, a flat piece of lumber can be connected to a round pile without making any holes in the pile. This removes any danger to the preservative on the pile.

The clamping plate is a flat, square piece of metal with teeth sticking up. Its main use is as a spacer between the railroad tie and the guard timber.

The claw plate is a round piece of metal with teeth rising up around the edge. It can be used to make wood to wood or wood to metal connections.

Connectors have widespread use because by using them the full strength of the individual timber is utilized. They spread the load over the entire area, thus relieving stress at connections. This makes it possible to use smaller, lighter timbers without so much bulk. The use of connectors has made possible the building of structures which would not have been possible without them. Some examples are forest outlooks, radio antennae, water tank towers, span roof trusses, arch bridges, etc.

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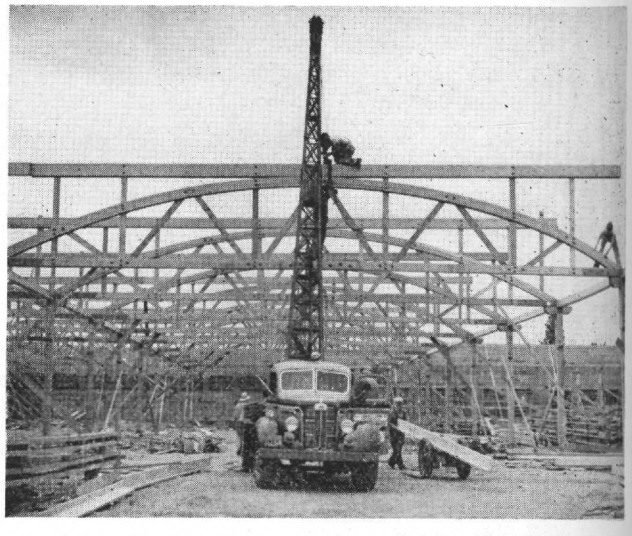

—*Courtesy Civil Engineering.*

Bowstring Arch with Extension for Flat-top Roof.

WOOD

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Though of extreme importance, these connectors are only one factor in the revival of wood. The most important development is that of the treatment of the wood itself. Scientists have discovered a new treatment of wood, the resultant product being called "compregnated wood". In this case, the wood is first impregnated with a solution of phenol and formaldehyde. Then it is put in a press of the desired form, under a heat of 300 degrees. The heat dries out the water and forms a resin within the cell wall structure. When the wood dries, it retains the desired shape.

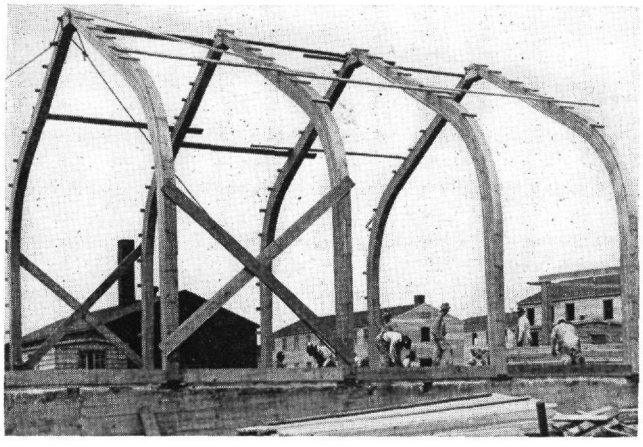
Compregnated wood is a dense, hard, strong substance almost impervious to water. It is being used extensively in the manufacture of airplanes because it has a strength comparable to that of mild steel and aluminum with a much greater stiffness due to the increased thickness. Neither does compregnated wood take as much riveting as metal. Another advantage is that it will not buckle or "flower" like aluminum. The weight is about one third that of other metals.

There is another method, different from the one just described, which has the same product. In this process the fact that about one third of the solid material in wood is lignin (natural glue) is taken into consideration. The wood is soaked in a urea solution at 212 degrees Fahrenheit. When it is taken out it can be twisted and molded like rubber. As soon as the wood cools, the lignin sets and the shape is held.

A process of this sort produces a wood substance which is oil, weather and fire resistant. The Navy is using ribs made of bent, urea treated white oak in their vessels.

Besides its most important use in planes, boats and building, there are some miscellaneous uses of wood which are interesting. Some products which are being made of wood are wooden pails, wooden "cans" to replace tin cans, machine bearings, shoe soles (might be useful now), bottle caps, mattresses stuffed with sequoia felt and a wool-like fabric made from wood chips.

Wood has done many things already and scientists are still making new discoveries. From all these things it is certain that wood will play a large part in the post war world.



—Courtesy Civil Engineering.

Laminated Roof Trusses